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CONSTRUCTION AND EQUIPMENT

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CONSTRUCTION

CHAIRMAN USSR GOSSTROY NOVIKOV ON CONSTRUCTION INDUSTRY TASKS

Moscow IZVESTIYA in Russian 27 Nov 81 p 2

/Article by I. Novikov, deputy chairman of the USSR Council of Ministers and chairman of USSR Gosstroy: "The Economy Must Be Economical: Progressive Plans for Construction Projects"7

/Text The 26th Party Congress has determined the main task for the 11th Five-Year Plan, which consists of ensuring the further growth in the well-being of the Soviet people based on the steady, persistent development of the national economy, speeding up scientific-technical progress and switching the economy to an intensive development path, the more rational use of the USSR's production potential, and doing everything possible to conserve all types of resources.

In the plan for the 11th Five-Year Plan, which was approved by a session of the USSR Supreme Soviet, specific measures are outlined for accomplishing a dynamic and balanced development of the Soviet economy. At the November (1981) Plenum of the CC CPSU, Comrade Brezhnev emphasized the need to significantly improve capital construction as a decisive sector of the five-year plan. The correct and reliable way of dealing with this task is to substantially increase the effectiveness of capital investments and to ensure the timely completion and assimilation of planned production capacities and to put this sector of the economy on a path toward intensive development.

The development and technical re-equipping of economic sectors begins with planning. The designers, and there are more than 800,000 of them, are to be found at the construction sites of the projects. They are the linking level between science and production. It is they who determine the countenance and content of future construction undertakings. In capital construction the gradual development of the economy depends largely upon them - the "trailblazers".

We have experienced, highly skilled designers. They meet their obligations with pride - their efforts have led to the construction of a large number of enterprises, buildings and facilities, which meet present-day requirements. The list of their accomplishments includes: the first section of the atomic machine building giant in Volgodonsk /Atomash, the Ust'Ilimskiy cellulose plant, the Nikolayevskiy alumina plant, the Tol'yatti nitrogen fertilizer plant, the oxygen-converter

shop at the Cherepovets metallurgical plant, and many other key construction projects.

The design work on housing and civil construction projects has improved significantly. Plans have been created and executed for massive construction undertakings, including for rural locations and regions in Siberia and the Far East. All Soviet cities, the majority of the central farmsteads of the kolkhozes and sovkhoses, and a significant portion of the other populated areas have been provided with modern general plans and designs for the layout and right to build.

At the same time there are still significant shortcomings in the planning work, which are delaying scientific-technical progress in the national economy. The plans do not always take into consideration the latest achievements, progressive technology and modern methods for organizing construction. In many cases no provision is made for the economical use of material resources and increasing labor productivity. Extended time periods for planning work and construction often result in outdated design solutions and an increase in the estimated cost of construction projects.

The CPSU Central Committee and the USSR Council of Ministers in their decree of 30 March 1981 outlined a set of measures for improving the designing and estimating work in the Soviet Union. The ministries and departments have already responded to the realization of these measures. The USSR Gosstroy has approved and adopted a basic document on design work. This is the "Instructions on the composition and sequence of drafting, coordinating and approving of plans and estimates for the construction of enterprises, buildings and facilities", which exact high requirements for the composition and content of plans. The role and responsibility of the general design organization is increased. This organization has been given full responsibility for the entire plan and the obligation to coordinate its work in all elements and sections, and not to mechanically compile numerous volumes of documentation, as was done previously.

Also drafted was the "Basic directions for raising the technical quality of construction during the years 1981 through 1985." These guidelines were prepared while considering the proposals of the construction and industrial ministries, scientific-research and planning institutes. The catalog of scientific-technical achievements now includes the results of the available most effective design work, which are recommended for use in practical work. A review of all outdated norms and standards has been organized. To thoroughly study the condition and improvement of design and estimate work in the Soviet Union, the Central Scientific-Research and Planning-Experimental Institute for the Methodology, Organization, Economics and Automation of Design Work and Engineering Research (TsNIIproyekt) has been created.

However, there is still much to be done to improve design work. The final result of a well-organized designing work must be newly built or modernized leading enterprises and construction projects, which will ensure the manufacture of a high quality product.

Design work cannot be improved without improving the planning of design and survey work. More attention must be given to the pre-design development of all questions having to do with design work and construction. In many cases the planning of design and survey work and their execution still have not been coordinated with the capital construction plans and the prospects of developing the appropriate sectors of the national economy. For this reason during the years of the 10th Five-Year Plan there was a sharp increase in the number of designs not used in construction. The volume of design and survey work for unfinished construction was more than nine billion rubles. Moreover a portion of the design documentation is now out of date and will not be used at all. In turn the construction of many new construction projects often was started without approved designs.

A similar situation was, in particular, the consequence of the fact that the plans which were drawn up by the ministries and departments for the development and siting of the appropriate sectors of the national economy by regions could not become the basis for making decisions regarding the designing and construction of enterprises. They were inadequately coordinated with the prospects for the development of the national economy and with the possibilities for related sectors and with the material resources. This is why the plans for design and survey work were often unstable and why significant planning errors were made in providing cooperative deliveries, raw materials, semi-manufactured articles and others to the enterprises that were being put into operation.

The ministries and departments in accordance with the CPSU Central Committee and USSR Council of Ministers decree on improving design work are required, commencing in 1982, to begin drawing up sectoral and regional plans for the next 15 years. At this stage it is necessary to thoroughly review the possibilities of increasing production capacities through modernization and re-equipping of existing enterprises. The designing and construction of new construction projects must be considered only after exhausting all other reserves for production growth using these factors.

The plans for the development and siting of sectors and production capabilities must be the basis for the formation of five-year capital construction plans and plans for design and survey work. They make it possible to create the needed conditions for designing enterprises and construction projects at a high technical and economic level, and also to reduce the amount of design work included in unfinished construction and the elimination of "wasted" work.

Out of all factors which influence the raising of the efficiency of capital investments, the determining factor is the progressive nature of the accepted technology of the production. Here is an example. In the chemical industry there was a switch to a new method of producing vinyl chloride according to a balanced layout with the open placement of large per-unit capacity equipment. This made it possible to use less expensive raw material - ethylene in place of acetylene with a reduction in cost per ton of product amounting to a 4-fold savings.

The builders were able to effect a 15-fold reduction in construction and installation work and a 10-fold savings in labor-intensiveness in building enterprises.

The organization of production and installation of unit and assembled unit equipment, the open placement of equipment provided a substantial change in the construction and layout solutions for enterprises of the chemical and food industries. This made it possible to effect a 10 to 15-fold reduction in labor intensiveness and to speed up the time periods for the construction.

Soviet machine builders have done a lot for creating progressive types of equipment and technological processes. They deserve praise and honor for this. But we do have some complaints against them. Because of the large sizes and low productivity of some Soviet equipment, each year we must build millions of superfluous square meters of production space. The ministries and departments and their expert subdivisions cannot continue to approve designs for the construction and modernization of enterprises, in which the technological processes and equipment do not meet the world standard.

The workers of the design and survey organizations are today faced with important tasks for protecting the environment and making rational use of natural resources. There are significant reserves available for accomplishing this and for raising the quality of design work.

We are speaking about the creation of waste-free or low-waste technologies. This is the primary direction in the measures for protecting the environment and an additional reserve for obtaining many valuable and rare materials for the needs of the national economy.

Questions having to do with protecting the environment and making rational use of natural resources have been given serious attention at the Sixth Session of the USSR Supreme Soviet, the 10th Convocation.

The main task put before the designers is to make maximum use of scientific-technical accomplishments and leading construction experience in their designs.

Comrade L. I. Brezhnev, speaking at the November (1981) Plenum of the CPSU Central Committee, pointed out the need to activate work in this direction.

Scientific-technical accomplishments and the results of scientific research are not always fully used in designs. And not enough attention is given to questions having to do with conserving material, labor and power resources, protecting the environment and making rational use of natural resources.

Not everything is at it should be in the designing of housing and civil construction. The contrast between positive experience in this field and the massive construction of many cities and villages is great. In practice the city builders are permitting increased sizes of city spaces and are not always solving transport systems economically. They are also permitting excesses in the designing of public

and individual buildings. All of this results in increased costs for construction.

To raise the quality and economy of designs the ministries and departments are approving for two five-year periods the basic directions for designing using progressive relative indicators for cost and the use of materials. Toward these goals they must consider assignments for the extensive utilization in designs of scientific-technical achievements.

In the current five-year plan they must increase the production of new effective materials, manufactured articles, structures and construction equipment. Their use along with progressive construction industry technology must be extensively considered by the designers when drafting design documentation.

Considering the demographic situation, special attention is to be given to questions having to do with reducing labor intensiveness and lowering expenditures for manual labor. All of this must be justified in the design work by estimates in comparison with the best Soviet and foreign examples.

One of the basic ways of adopting industrial construction methods is standard designing. The USSR Gosstroy approved the "Basic directions for the development of standard designing for 1981 through 1985 and to the year 1990 for the construction of industrial, transportation, communications and agricultural projects." The use of the more progressive technological processes, highly productive equipment, rational planning and layout solutions, effective structures and materials, and leading construction methods is mandatory for a standard design.

The collection of standard designs and design solutions must be carefully reviewed by the ministries, departments and republic-level state committees for construction affairs. They also must keep these documents up to date by developing technological and design solutions that can be adapted to specific natural and climatic zones and conditions of construction. This also applies to modernization and re-equipping work. It is necessary to extensively develop the drafting of standardized volume-layout and design solutions for enterprises with a changing production technology.

However, while improving the technical-economic characteristics of enterprises and construction projects, one must not forget about their architectural quality, without permitting excesses in this endeavor.

A significant amount of work must be done to improve the drafting of designs for organizing construction work and designs for the execution of the work. The timely introduction of enterprises and construction projects into operation depends to a large extent upon the quality of these documents. The design work for organizing construction must become a key part of the design. It must be carefully composed, taking into consideration the specific conditions of the construction project and the norms for the length of time required for the construction. The design for the execution of the work, the drafting of which must be the

concern of the "Orgtekhstroy" /organization of equipment and construction/ and the construction organizations, based on the existing organizational-technical level of the construction organization, must ensure the completion of the construction projects within the established time periods, promote the reduction of manual labor and the transfer of most of the manual labor to plant conditions.

Much needs to be done to improve estimating work. The main shortcoming here is the unreliability of the estimated cost of construction projects and errors committed in preparing the estimates.

Data banks must be created on the cost of previously built and designed construction projects and their basic structural elements; then in compiling the passports for the design work the necessary cost indicators must be shown in these documents. Such a data bank will become the basis for drafting expanded estimate norms and indicators and for a more reliable determination of the cost of construction and will make it possible to more deeply analyze the technical-economic quality of the designs.

The designers are obliged to consider the dynamics of price-forming factors in their summary estimate of the cost of construction. The USSR Gosstroy has approved the appropriate methodological instructions. The ministries and departments must organize the drafting of adjustments, which take into consideration a change in the cost of construction, this year.

Next year they must improve the system of technical norm-setting, which is a crucial element of the scientific-technical basis of designing. They must significantly simplify this system and reduce the number of kinds of normative documents, eliminate duplication, unwarranted detailization, reduce the time periods between the completion of the scientific-research and experimental work and the reflection of their results in the normative documents.

Improving the system of management is an important part of ensuring the efficient work of the designing organizations. The ministries and departments have not given enough attention to improving the network of designing and surveying organizations until recently. The work of the small and non-specialized organizations is inefficient and in the majority of cases of a poor quality.

The network of design-technological organizations in the construction ministries must also be re-examined. It is necessary to establish order in their structure and personnel; the workers freed through these efforts must be transferred to the construction sites and enterprises of the construction industry.

The USSR Gosstroy, USSR Gosplan, the ministries and departments are finishing a proposal for a comprehensive set of programs for the extensive automation of design work. The efforts of the large scientific-research and designing institutes are being directed at developing

systems for the automated designing of construction projects (SAPR). But the realization of these programs and systems to a large extent depends upon the practical measures of the ministries and designing organizations on the rigging of the necessary equipment.

The tasks for improving designing and estimate work are very demanding and honorable. In response to the party's appeal throughout the USSR the patriotic movement of the workers to increase the efficiency and quality of work has spread with new force. The designers are actively participating in this. The collective of the Gidroyekt institute has come forward with an initiative to raise the scientific-technical level of designs and to reduce on this basis the estimated cost of the construction of projects and to conserve labor and material resources. The ministries and departments must broadly disseminate this leading initiative, which was approved by the CPSU Central Committee, and develop a socialist competition under the slogan "timely, economical designs for the construction projects."

The decree on further improving the design and estimate business is opening new, broad opportunities for creativity, the general search for optimal solutions, raising the quality and speeding up the publication of documentation. Fulfillment of the planned measures will undoubtedly result in the improvement of construction and modernization of projects and raising the effectiveness of capital investments.

8927

CSO: 1821/58

CONSTRUCTION

GOSSTROY OFFICIAL NOTES NEED FOR IMPROVED INFRASTRUCTURE IN BAM ZONE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Nov 81 p 2

[Article by F. Fomin, first deputy chairman of Gosstroy USSR and chairman of Gosgrazhdanstroy [State Committee for Civil Engineering Construction]: "Plant and Home Equivalent Installations--a Permanent Visa for the BAM"]

[Text] The successes achieved in the construction of the Baykal-Amur Mainline [BAM] are well known. The 26th Party Congress assigned the task--to inaugurate in the current five-year plan the movement of trains throughout the length of the line.

The Baykal-Amur Mainline is not just another railroad but the first and the most important stage in the richest but very sparsely inhabited territories. Figuratively speaking, it is the axis which will help to set in motion the enormous potential of the northeastern regions and draw into the national economy turnover the incalculable natural raw material resources of these regions. And this axis is required to be an exceptionally dependable one. But it needs a developed social and domestic infrastructure. It is particularly necessary because of the fact that in most cases the natural conditions there are quite harsh. It is therefore especially important to provide for the greatest possible development of a highly comfortable urban environment--conditions for productive labor and an environment which is attuned to the life and leisure of the people.

Thus, the rates of economic development of the BAM zone--and also the kind of task assigned in the "Basic Directions" adopted by the 26th Party Congress--will in very large measure be determined by the rates of development of an infrastructure. In theory everyone recognizes this. But in practice some depart from the planned procedure. This is also something that troubled the participants in the third scientific and practical conference on the problems of economic operation of the BAM zone, a conference which took place this fall in Alma-Ata.

The principles underlying the formation of the social and domestic infrastructure are delineated in the general system of regional planning for the zone of BAM impact, in the regional planning projects of the individual oblasts and territorial production complexes, and in the general plans of the cities and settlements.

In the main the city construction suggestions and plans are being observed in the practical work. There are some examples of good complex construction of settlements.

The volumes of residential housing construction are increasing. For the BAM zone we have prepared more than 160 plans of dwelling houses and block sections, which plans take into account the various construction conditions.

However, the set of plans in use is still inadequate. There is very little construction of buildings with few stories, buildings which must fully meet the local requirements. The volume and design planning decisions are not always sound. These difficulties are exacerbated by the deficiencies in the construction itself. Very often the plans for putting cultural and personal service installations into operation are not fulfilled. There are frequent violations of technology and the buildings are often put into service without the public welfare amenities.

A serious flaw which has developed in the work is the construction of a large number of temporary settlements which entail the expenditure of considerable assets. At the same time, the construction management groups of the BAM and the Glavbamstroy [Main Administration of BAM Construction] are not giving the proper attention to the erection of permanent housing and cultural and personal service buildings and they are violating the principles for over-all construction and superior development of engineering networks and structures.

As an example of a narrow bureaucratic and short-sighted approach to the solution of the problem we can cite the settlements of Kuvykta, Zolotinka, Ust'-Nyukzha and a number of others, where the level of public welfare and domestic service conveniences is very low. Even in Tynda, which is called the capital of the BAM, there is not enough housing and there is a lot of foot-dragging in the construction of public buildings, modern hotels, and public dining and personal service enterprises. We are falling behind in the development of an agricultural base to provide vegetables, milk and other products for the city population. Many of the trade enterprises are located in so-called "adapted premises," that is, again essentially temporary ones.

In effect the MPS [Ministry of Railways] and other customers are now injecting in the plans the lag in the development of the production sphere. As a result, the rates of housing construction and cultural and personal service construction are much lower than the rates of population growth. Thus, the amount of living space available per person is in some settlements only 1/2-1/3 of the norm. This shortage is an extremely painful one in the cultural and personal service enterprises and even more so in the children's preschool institutions. The BAM is a young people's construction project and there are of course many children there. Only one-third of them can attend kindergarten. What happens is that two-thirds of the number of women who possess construction and other skills that are needed here are compelled to stay home.

We thus today see coming to the fore with crucial intensity the question of systematic implementation of the scientifically validated concept of city construction development of an enormous zone and the formation of its social and domestic infrastructure, with elements which answer the special requirements of the region and its significance in the program for the country's economic development. For the development of this infrastructure we are today expending one-sixth of all the rubles invested in the development of the BAM zone. It is now time to change this proportion. The figures indicate that it is now necessary to invest twice as many rubles, that is, one-third of the total in order to achieve a balance with the

rates of development of the production and social sectors and to accomplish this with minimum losses.

However, both in the MPS and the Mintransstroy [Ministry of Transport Construction] and also in the Union Minenergo [Ministry of Power] and the other ministries and departments whose interests are affected by this the problems of the development of an infrastructure are judged from sectorial points of view. Also, come what may, the production tasks become predominant and the thoughts concerning the rear organizations remain just thoughts.

Isn't this why we are getting such slow development of this area's system of construction industry enterprises—the basis of stepped-up rates of city construction? At station Chimanovskaya they have not fully developed the planned capacities of the large-panel house construction shop and in Tayshet the Mintransstroy large-panel house construction plant is maintaining slow rates of construction. And in the BAM settlement the subdivisions of this ministry have in two years used scarcely one-tenth of the estimated cost of the installations of the brick plant, which is supposed to supply 60 million bricks a year. In the meantime the construction people are getting from the local enterprises less than one-third of the precast concrete and wall and nonmetallic materials. The rest is being transported over great distances and bought at exorbitant prices.

Even a pencil estimate indicates that in the next 10 years the capacities of the contract organizations concentrated in the BAM zone will experience considerable growth. There will also be a corresponding increase in their need for the basic building materials and structures. Should everything still be brought in from the outside? This is hardly economically sound.

Mintransstroy and Ministroymaterialov [Ministry of Construction Materials] USSR and in particular Minvostokstroy [Ministry of the Construction Industry of the Eastern Regions] must step up considerably their efforts along these lines and they must work out and implement large-scale measures for the development of their production base. The requisite figures are available—they were reported at the conference in Ulan-Ude. Now it is a matter of bringing them to fulfillment.

In addition to the ministries mentioned, participation in the development of the industrial construction base must also be undertaken by the ministries which are faced with the task of developing the natural wealth of this region.

We recall the following text of the "Basic Directions": "To develop the work for economic exploitation of the zone which encompasses the Baykal-Amur Railroad Mainline. To complete the planning work for the Udokan copper deposit. To continue the formation of the Southern Yakutsk territorial production complex and to complete the construction of the coal-mining pit, the concentration plant and the first section of the Neryungri GRES.

We already know what groups will be formed after the Southern Yakutsk but also virtually in the process of development in the form of planning projects are the Verkhne-Lensk, Severo-Baykal, Zapadno-Amur, Zeyskiy, Selendzhinskiy and Komsomol'skiy territorial production complexes and the Udokanskiy and Urgal'skiy industrial centers.

The implementation of this magnificent program requires enormous labor and material resources. With this scope it is necessary to concentrate the assets first and foremost for a superior development of the social and domestic infrastructure. The establishment of this infrastructure is a basis for holding the personnel. And in this instance personnel is the decisive requirement for fulfillment of the task in its entirety.

The means, like the responsibility for the over-all development, must be concentrated in the hands of the general builders. It is today possible to determine who they are for each territorial production complex and industrial center. Let us say in southern Yakutiya the largest volumes of capital investments are those of the Minugleprom [Ministry of Coal Industry] USSR. This ministry must also be responsible for the development of the complex as a whole and consequently also for the establishment of a well-planned habitable environment. There will thus be no decrease in the contractor's motivation for maximum development of the base of the construction industry. In Udokan the Mintsvetmet [Ministry of Nonferrous Metallurgy] USSR can become a general builder and in the Verkhne-Lensk, Zapadno-Amur, Selendzhinskiy and Zeyskiy complexes the Union Ministry of Timber, Cellulose-Paper and Woodworking Industry.

To coordinate the operations of all the concerned ministries and local organs and to exercise control over the progress of BAM zone construction and development it apparently makes sense to organize a special interdepartmental territorial commission under Gosplan USSR similar to the organ set up to increase the effectiveness of the management of the development of the West Siberian fuel and energy complex.

On the surface it may appear that all these questions have no direct bearing on the problems of city construction. But there is a direct relationship. Unless we have resolved the organizational, administrative and supply problems we simply cannot effectively and rapidly build the new, well-planned cities which should become control points for a broad economic development of the territory.

We are again and again reminded of Comrade L. I. Brezhnev's words in the 23. 20th anniversary report to the 26th Party Congress: "The individual most often leaves Siberia not because the climate does not suit him or his earnings are poor but because it is more difficult to obtain housing there and to get his child into kindergarten and because there are few cultural centers. This is why we plan in the current five-year plan to achieve still higher rates in these regions for the construction of housing and the entire social and cultural complex."

This is a party directive and we must be guided by it in making up our plans and conducting our practical affairs.

7962

CSO: 1829/66

CONSTRUCTION

REGULATION ON CAPITAL INVESTMENT IN HOUSING CONSTRUCTION

Moscow SOBRANIYE POSTANOVLENIY PRAVITEL'STVA SOYUZA SOVETSKIKH SOTSIALISTICHESKIKH RESPUBLIK in Russian No 29, Otdel Pervyy, 1981. Article 169

[USSR Council of Ministers Decree "On Steps to Increase the Effectiveness of Capital Investments Allocated for Housing Construction," No 972, issued 5 October 1981 and signed by I. Arkhipov, USSR Council of Ministers Deputy Chairman, and A. Larin, USSR Council of Ministers Deputy Administrator of Affairs]

[Text] As a result of systematic implementation of Communist Party policy aimed at raising the material and cultural standards of living of the Soviet people, a total of 530 million square meters of housing was built in the country in the 10th Five-Year Plan, enabling more than 50 million people to improve their housing conditions. Housing construction using new standard plans with improved architectural-layout and design resolutions was expanded significantly.

At the same time, there are serious shortcomings in housing construction which reduce the effectiveness of the capital investments being allocated for these purposes and lead to delay in putting fixed assets into operation and to additional expenditures of fuel and other material resources.

Large-panel house-building, the most efficient type of housing construction, is being developed slowly in a number of union republics and the production capacities of existing house-building enterprises are being used unsatisfactorily.

Housing construction frequently exceeds the established construction duration norms. Houses are accepted for use with serious incompletions and without public amenities on adjacent sites. The quality of construction-installation work, and especially of finishing work, remains poor.

In many cities, inordinately high estimated housing construction costs caused by the failure to observe planning structure and by inefficient numbers of stories or the construction of houses following individual plans developed in violation of planning norms and with excesses in architectural-layout resolutions are being permitted.

With a view towards eliminating the shortcomings in housing construction, ensuring its continued improvement and increased effectiveness of the capital investments being allocated for housing construction, the USSR Council of Ministers decrees that:

1. When drawing up summary five-year plans for housing, municipal-services, cultural and municipal-services construction, the union and autonomous republic Councils of Ministers and the kray and oblast Soviet of People's Deputies ispolkoms work out and approve the following, within their areas of authority, for each individual city planning to put a total of at least 35,000 m² of housing per year into operation:

an efficient housing construction planning structure;

the average estimated cost of a square meter of total housing space, with consideration of calculation indicators of the average estimated cost of one square meter of total housing space and the amount of such space to be put into operation, as approved by the USSR Gosplan for the particular union republic, USSR ministry (department), Moscow gorispolkom, Leningrad gorispolkom and by union republic gosplans for the autonomous republics, krays and oblasts.

The USSR Stroybank and Gosbank, beginning 1 January 1983, finance new housing planning and construction in the indicated cities only given the presence of a housing construction planning structure and average estimated cost per square meter of total housing space approved under the established procedure.

2. The union republic Councils of Ministers in 1981-1985:

limit the construction of housing of more than nine stories in all cities and settlements (except for Moscow, Leningrad and Kiev). Permit the construction of such houses only as exceptions, based on architectural, urban development and economic requirements;

permit the use of individual plans in housing construction in exceptional cases, on the condition that they conform to detailed layout plans and with mandatory observance of existing planning norms and an approved average estimated cost per square meter of total housing space;

ensure supervision of city observance of the housing planning structure and average estimated cost per square meter of total housing space.

3. It be noted that USSR Council of Ministers Decree No 173 "On Steps to Expand Urban Comprehensive Flow-Line Construction of Housing, Cultural, Personal-Services and Municipal-Services Projects," of 1 March 1978, (SSSR SP, No 6, 1978, p 36), is being carried out unsatisfactorily.

The union and autonomous republic Councils of Ministers, USSR ministries and departments, and Soviet of People's Deputies ispolkoms are to complete the creation of single-client services for contractor construction of housing, cultural, personal- and municipal services projects, manning them with skilled personnel, in the capitals of the union and autonomous republics, in kray and oblast administrative centers, and in cities of over 100,000 people, in 1982.

The union republic Councils of Ministers are to refine the structure and staff of Soviet of People's Deputies ispolkom capital construction administrations (departments) performing single-client functions in 1981-1982, with consideration of entrusting them with duties and annual construction volumes within the total size of the administrative apparatus and expenditures on its maintenance established for the republic.

Beginning in 1982, the USSR Gosplan, USSR ministries and departments and union republic Councils of Ministers anticipate the start-up of housing and children's preschool institutions in the first half of the year in amounts of generally at least 40 percent of the annual plan assignment.

The construction ministries and departments and State Committee for Civil Construction and Architecture attached to the USSR Gosstroy ensure continued improvement in housing construction organization and the extensive introduction, jointly with single clients, of progressive methods of comprehensive flow-line construction of housing, cultural, personal- and municipal-services projects permitting projects to be put up and released for operation smoothly by month and by quarter.

4. The construction ministries and departments:

ensure a reduction in the labor-intensiveness and cost of housing construction through comprehensive engineering preparation and production-technological procurement in complete sets, raising the level of factory finish and quality of components and items, using industrial components for walls and floors, and introducing progressive finishing work methods;

complete the transition of subordinate large-panel house-building enterprises producing more than 100,000 m² of total housing space per year to work using the house-building combine method of "turnkey" release of projects and the construction-installation brigades of these enterprises to the integral-process flow-line brigade contract method, enlisting specialized subcontractor organizations to do special jobs, during 1981-1985.

5. It is established that, beginning in 1983, the planning, construction and acceptance of housing and public building in new housing microrayons for operation must be done primarily in the form of completed urban development complexes in which the construction of institutions and enterprises connected with services to the population, as well as all work on utilities equipment, public amenities and landscaping, must be completed in accordance with the approved plans for building up these microrayons by the time the housing is released for operation.

The State Committee for Civil Construction and Architecture attached to the USSR Gosstroy work out and approve, with the concurrence of the USSR Gosplan, the USSR ministries and departments concerned, and the union republic Councils of Ministers, a provision on the urban development complex in the first half of 1982.

6. The USSR ministries and departments, union republic Councils of Ministers and Soviet of People's Deputies ispolkoms:

ensure that the proportion of large-panel housing be brought up to at least 60-65 percent of the total amount of state and cooperative housing construction by 1985 and improve the use of subordinate house-building enterprise production capacities with a view towards raising the use coefficient for these capacities to 0.85-0.9 by 1984;

increase the construction of housing using new standard plans with improved apartment layout and improved operating conditions to approximately 75 percent of the total amount of state and cooperative housing construction by 1985;

develop the construction of housing with components of monolithic reinforced concrete foremost in the country's southern regions, in regions of high seismicity, in cities with an inadequately developed large-panel house-building base, as well as on sites in large cities which are important for urban development, using progressive types of stock forms and means of mechanization for transporting and pouring concrete. Expand the construction of such houses by reducing the construction of less-economical housing.

7. The USSR ministries and departments and union republic Councils of Ministers:

a) ensure strict observance of the construction duration norms for housing, cultural, personal- and municipal-services projects, not permit the scattering of capital investments, labor and material resources, promptly create technologically substantiated construction stocks, and put material-technical supply in proper order at construction projects and house-building enterprises.

The USSR Stroybank and USSR Gosbank not undertake the financing of housing, cultural, personal- and municipal-services project construction using titles lists which have not followed existing construction duration norms;

b) bring the amounts of unfinished housing construction down to established norms in 1983.

8. The State Committee for Civil Construction and Architecture attached to the USSR Gosstroy:

a) ensure supervision of city observance of an efficient housing construction planning structure, average estimated cost per square meter of total housing space and established construction duration norms for them, the quality of housing and civil construction, comprehensiveness of housing development, microrayon and settlement build-up and the effective use of urban land, as well as the use in housing, cultural and personal-services plans of architectural-layout and design resolutions and utilities equipment systems which ensure continued rise in the level of industrial construction and lower expenditures of labor, material, fuel and energy resources;

b) analyze testing and statistical reporting data on observance of the planned housing construction structure and average estimated cost per square meter of total housing space in the union republics, krais, oblasts and cities and submit annual reports on this question to the USSR Gosplan and USSR Gosstroy annually.

The USSR Gosplan and USSR Gosstroy take effective steps to reveal instances of violations of these indicators.

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CSO: 1821/060

CONSTRUCTION

COST, ANALYSIS OF UNFINISHED CONSTRUCTION DISCUSSED

Moscow VESTNIK STATISTIKI in Russian No 12, 1981 (signed to press 18 Nov 81)
pp 44-46

[Article by A. Levin, Moscow: "Recordkeeping and Analysis of Unfinished Construction"]

[Text] The article of I. Perepechin entitled "On Statistical Study of Unfinished Construction," which was printed in VESTNIK STATISTIKI (No 10, 1980), raised the issue of the inadequacy of the method used to evaluate the current level and variation of the amount of unfinished construction and also offers recommendations about changing this method of estimation.

It would seem that neither the raising of the issue, nor the solution proposed can be taken up outside the context of the current practice of establishing standard allowances, planning and recording unfinished construction. However, the author of the article is juggling abstract formulas, and in his computations he is mainly using hypothetical numerical data.

The figures published by the USSR Central Statistical Administration on unfinished construction in state and cooperative enterprises and organizations (not including kolkhozes) in absolute terms (in millions of rubles at the end of the year on the basis of the actual cost for the builder) and in relative terms (in percentages of the volume of capital investments for the year) are based on the procedure that was in effect until 1981 for planning and recording capital investments as volume indicators of resources assimilated. With this taken as the point of departure, an evaluation is also made of fulfillment of the capital investment plan in which the general orientation is toward the amount of resources assimilated. The analysis of the current status and variation of unfinished construction has the same orientation.

The decree of the CPSU Central Committee and USSR Council of Ministers dated 12 July 1979, as is well known, has introduced essential changes in the planning of capital construction. Now the builder is assigned ceilings rather than amounts of capital investments and construction and installation work. The figure on capital investments ceases to be the principal indicator in planning and evaluation and becomes a resource indicator subject to a limit. The principal indicator used in planning and evaluation will now be the activation of fixed capital, production capacities and projects, i.e., the indicator of the end result of construction from the standpoint of the national economy.

The construction industry's orientation toward the end result from the standpoint of the national economy necessitates a new approach to planning, recording and evaluating the current status of the intermediate result of construction--unfinished construction. That is why both the formation and dynamic behavior of unfinished construction must be oriented toward attainment of the end result of construction.

The proposal made in this connection by I. Perepechin concerning the need to take into account the degree of completion of unfinished construction in analyzing its current status and variation does in principle have some merit. The question is merely how to ensure that the degree of completion of unfinished construction is properly taken into account, especially when its actual size is being compared to the standard allowance.

He uses this mathematical model to analyze the current status and variation of the size of unfinished construction: $H_y = T_c \cdot \Gamma_{cs}$. This formula of the interrelationship is quite correct from the purely mathematical viewpoint, since it corresponds to the identity obtained by expansion, which is given in the article:

$$\frac{H}{K_r} = \frac{C_c}{K_r} \cdot \frac{H}{C_c}.$$

This fact has apparently served as the basis for the description that followed of the functional relationship among real economic indicators substituted into this formula: "The longer the construction time, or the greater the degree of completion of construction, the larger the volume of unfinished construction, other things being equal." It would seem that in reality matters are far more complicated than that.

In construction, because of its specific technical and economic peculiarities, there is essentially no occasion to speak of what are referred to as "other conditions being equal." Every project and every construction site has its own individuality, and one can hardly fit the entire set of conditions determining the size of unfinished construction on them into the formula of the functional relationship given above, which contains only two factors. Only at the macrolevel (sectoral or intersector level), where operation of the law of large numbers is manifested, can this formula be applied.

The figures from the compendium of standard amounts of partial construction (stroitel'nyy zadel) given in the article pertain only to those two factors and unfinished construction, but the relationship described above is not observed among them. For instance, if the average construction time increases from 2.5 to 4.5 years, or 1.8-fold (4.5:2.5), the relative size of unfinished construction increases 1.6-fold (120:72), the degree of completion of construction drops to 0.92 (36:39). The relations between the computed data yield a result which is greater than unity: 1.67:0.92:1.8 = 1.008, and not 0.74-0.76, as the author found. It would seem that the relationship among the figures for standard amounts of partial construction is based on a different and more complicated interrelationship. This was indeed observed by I. Perepechin, when he examined the interrelationship among the standard figures moving horizontally (across the lines of the table) instead of vertically (down the columns of the table). It turned out that the product obtained by multiplying the average construction time

by its degree of completion did not yield the standard size of unfinished construction. He explained this failure to conform to his model in terms of alleged differences in the method of computing the average construction time as an indicator in the standard amounts of partial construction and in the mathematical model. In the former case this time is calculated as the weighted arithmetic average, while in the latter case it is the harmonic average. Having furnished this explanation and having shown by additional computations based on the same model that the harmonic average of the construction time is 24-26 percent less than the same based on the arithmetic average, the author comes to the following unexpected conclusion: "... in finding the standard size of unfinished construction the type of average used has no fundamental importance."

One can hardly agree with that conclusion. It is not legitimate to derive values for the harmonic average of the construction time from data on unfinished construction and its degree of completion calculated on the basis of the arithmetic average figures for the construction time. The construction time based on the harmonic average must have its own corresponding values of unfinished construction and degree of completion.

Yet I. Perepechin feels that it is "possible to calculate the average as the weighted arithmetic average and consequently to use the first column of the table. But one might have computed it as the harmonic average and used the fourth column. The relations between these two columns are stable." The stability referred to is observed only when a formally mathematical approach is taken. But even that approach reveals that one and the same standard amount of unfinished construction (72 percent) and degree of completion (39 percent) correspond to different average periods of construction, for example, 2.5 years and 1.85 years.

In connection with what we have said, the calculations the author made to adjust the standard proportion of unfinished construction in order to make it comparable with the actual proportion cannot in our opinion serve as the basis for evaluating the current status of unfinished construction. At the macrolevel they would make sense if the standard amounts of partial construction were calculated on the basis of the harmonic average of the construction time. The standard amounts in effect are based on the weighted arithmetic average construction time and therefore cannot be used for the calculations indicated.

I. Perepechin touches in his article on the method of computing the average construction time by the formulas of the weighted arithmetic average and the weighted harmonic average, offers elaborate expressions of those formulas and concludes as follows: "We will not take up the virtues and shortcomings of the specific types of average." Yet they have a direct bearing on the essence of the problem he is solving.

As is well known, title lists of construction projects, which make provision for the necessary amount of capital investments, amounts of construction and installation work, and so on, are compiled in conformity with standard construction times. From the standpoint of the national economy it is not a matter of indifference which type of construction time is used as the basis for compiling the title lists, which now, pursuant to the decree of the CPSU Central Committee and USSR Council of Ministers dated 12 July 1979, are to stand as an unamended

planning document over the entire period of construction. It is important to emphasize this because the weighted average construction time and the harmonic average construction time, computed from one and the same initial data, do not correspond in magnitude, and consequently, they determine differently the figures given in the title lists which are calculated from them.

In our opinion solving the problem of analyzing the dynamic behavior of the actual amount of unfinished construction on the basis of the same mathematical model is simpler than the question of evaluating the current status of the actual proportion of unfinished construction as compared to the standard, since for two comparable reporting periods it is easier to ensure that all the indicators going into the mathematical model have been calculated in the same way. The amounts of unfinished construction being compared are put in comparable form with the conversion formula the author proposes.

Finally, even in this case a certain amount of arbitrariness in the computations is not eliminated, but this is inevitable when we are speaking of the macrolevel. All indicators in the model then become faceless. They are far from the real conditions of construction, which are influenced not only by factors having solely to do with construction, but also by other factors not related to construction: for example, structural factors and the like. It is the task of more thorough analysis to take the influence of these factors into account as well.

A separate and very important question among those we have touched upon is the procedure for recording and reflecting in the builder's reports the volume of unfinished construction when settlement is made between the customer and contractor for enterprises, complexes, phases and facilities capable of independent operation on which construction has been completed and which are ready for the manufacture of products or the rendering of services, at the estimated cost of the marketed construction product. A definitive solution has not as of this date been found for all the elements in this procedure, and this cannot but affect the actual volume of unfinished construction.

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CONSTRUCTION

CITY PLANNING IN TYUMEN' NORTH

Moscow ARKHITEKTURA SSSR in Russian No 4, Apr 81 pp 30-31

[Article by architect A. Abolonin (Surgut): "Shaping Cultural and Personal Services in the Base Cities for Mastering the Tyumen' North"]

[Text] The party and the Soviet government have paid comprehensive attention to developing the Tyumen' North, the country's primary petroleum and gas extraction center. The "Basic Directions of USSR Economic and Social Development in 1981-1985 and Up To 1990" set the task of ensuring continued development of the largest territorial-production complex in northwest Siberia, strengthening the construction base and intensifying housing, sociocultural and road construction.

The 10-year stage of intensive development of cities of the Tyumen' North enables us to analyze somewhat and focus the attention of the architectural community on a number of problems in shaping the system of cultural and personal services, which performs an exceptionally important role in creating a valuable social environment for the activities of the population of this region.

Construction experience in the base cities of the central Ob' region -- Surgut, Nizhnevartovsk, Nefteyugansk -- in which 85 percent of the urban population of the Tyumen' North now live, provides quite a complete understanding of how the services system is being shaped.

Unfortunately, it must be verified that the most characteristic feature of the practice which has evolved is a mechanical transfer of the experience and methods of organizing the services system from cities situated in more favorable natural and climatic conditions, together with the problems of these cities, to the conditions of the Tyumen' North. It is difficult to agree that the cities of the Tyumen' North will continue to be developed this way, without consideration of the specific problems of shaping cultural and personal services stemming from climatic features, the demographic composition of the population and the specifics of its activities.

The historically small population of the Tyumen' North is the clearest characteristic of the harshness of the natural environment in terms of man's living there. The uncomfortable temperature and wind conditions, which continue for 5-6 months a year, set us the task of neutralizing their negative effect on man through architecture, and foremost by putting services buildings close to housing and by creating housing developments with a full complement of public buildings for everyday services.

The uniqueness of the demographic composition of the population of cities of the Tyumen' North is the mobility of their residents, whose average age is under 26, the presence of a large number of children, and the few people of pension age. The number of children of preschool age is 170 per 1,000 family members, of preschoolers -- 200 per 1,000, and of pensioners -- 20 per 1,000. Approximately 25 percent of the base-city population is young single people living in dormitories. The population of cities of the Tyumen' North has not aged during the recent period and is being renewed through migration processes.

One feature of the Tyumen' North is the high employment of the able-bodied population in special-effort [vakhtovaya] work, which is connected with trips (flights) out to oil and gas fields of from 5 to 15 days, sometimes longer, and trips back to the base cities to rest for an equal period, that is, the base city is a rest city for those working under special-effort conditions, places to relieve physical and psychological stress, restore one's health and ability to work hard.

The existing organization of cultural and personal services in the base cities is set up on the basis of a four-step system, "microrayon - housing region - layout region - city." The first step, the microrayon services network, has received the greatest development, reflecting a general trend in cities of the North to put the services system as close as possible to housing.

The step principle of city layout organization provides a sufficiently rigid, although not so precise, system of shaping a development site and dividing it into microrayons. Microrayons of 12,000-15,000 residents are the most widespread, both in terms of size and in terms of population.

In the Tyumen' North, with the special demographic composition of the population, two independent and spacious schools are in the microrayons; they are generally located in adjacent sectors, along with a number of food stores and public catering enterprises (microrayon No 8 in Surgut has six food stores and three public catering enterprises), several personal-services centers (microrayons Nos 1, 3 and 5 in Nizhnevartovsk have 3-4 such centers each) and at least four children's preschool institutions. This encourages planning organizations to consolidate public buildings (a method widely used in the central zone and in southern regions of the country), increasing the service radius and counteracting the harsh climatic conditions of the North.

Many microrayons built and planned in base cities of the central Ob' region could painlessly be divided in two, each part with its own school and required network of public services, reducing the access radii approximately two-fold. And these "halves" could also be called microrayons, but it would seem more accurate to call them "housing complexes."

The very name "housing complex" determines the unity of housing and public service buildings, the method of planning it, the compactness and architectural unity of the development, a certain level of services, and also that the complex will be limited in size (as distinct from microrayons, the number of residents would vary from 4,500 to 20,000 people).

The extensive use of various methods of modularizing buildings, including public ones, would permit emphasizing the individuality of each housing complex.

One of the main questions is housing complex size, which is largely determined by the services structure. In the North, preference should be given to a two-stage services system: the first stage must be part of the housing complex, with access on foot within 5-7 minutes (radius of 200-250 meters), meeting the daily needs of the population; the second stage is set up on a city-wide level, with city-services public buildings located in centers with good transport access, to meet the periodic, occasional needs of the population (in good weather).

Based on the "northern" structure presented, Construction Norms and Regulations calculation indicators for services institutions and enterprises must be differentiated for the two stages.

The widely used special-effort method of utilizing the deposits of the Tyumen' North, which employs many young people, requires special attention to organizing the leisure and free time of those workers, comprising 50 percent of each calendar month, or that time special-effort workers are resting in the base city. This problem, which has no analogs in terms of scale, is complex and difficult, but that does not give us, and especially scientific-planning organizations concerned with the North, the right to forget about it when planning cities or to relate to it as a nonexistent problem. Special-effort work methods demand the expanded construction of medical-recuperation and preventive-medicine centers, cultural-entertainment institutions, movie theaters, hobby clubs, libraries, sports facilities and other buildings in the base cities for young people to engage in popular leisure and free-time activities. The greater purchasing power of the population in the North also requires a better-developed system of trade and personal services.

Returning to the question of the size of housing complexes, it should be said that it is appropriate to include, in addition to apartments for families, hotel- or dormitory-type houses for single people, enabling us to broaden the composition of public buildings and premises and better provide the population of the housing complex with cultural and personal services, as well as an appropriate set of buildings for cultural and personal-services institutions (schools, children's preschool institutions, public health and trade facilities, and others).

The considerable creative work facing us in the 11th Five-Year Plan on building more base cities in the Tyumen' North sets the task of qualitatively improving the architectural environment for northerners and creating highly artistic, memorable cities appropriate to the special natural and climatic conditions of the North.

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METALWORKING EQUIPMENT

AUTOMATION OF MACHINE TOOLS

Computer Controlled Machine Tool

Moscow KRASNAYA ZVEZDA in Russian 19 Aug 81 p 4

[Article by V. Khrustov: "The Computer Controls the Tool"]

[Text] New items are entering our lives today at a remarkable rate. New machine tools, new devices, new aircraft and air-cushion vessels, new fibers and medications, new everything. But before a new item can be put into use it must be tested rigorously and in great detail.

We will be reporting on the testing of parachutes, television sets, railroad tracks and drilling machines, solar batteries and construction sites -- in a word, everything new -- under the title "Tests in progress".

The testing of a new nuclear ship or motor vehicle is easy to understand. But how do you test an ordinary metal cutting machine tool? You will agree that most of us have only an approximate, or more precisely rather vague, notion.

Although I had not expressed all of these doubts to him, Yuriy Mikhaylovich Zhed', chief designer at "Krasniy proletariy", quickly turned our conversation from the office to the shop.

"You will note," he said as we approached the testing area, "that a modern program controlled machine tool is an extremely complicated technical system which is loaded with precision mechanics and sensitive electronics. If we compare the program device of the tool with, say, the computer aboard a modern passenger aircraft, the main difference is only that different problems are solved. Therefore, it is just as natural and necessary to thoroughly test all assemblies, subassemblies and mechanisms in such a machine before putting it into operation as it is to make traditional checks of all systems of an aircraft before making a scheduled flight".

A 16K20T1 machine tool is being prepared for testing in the testing section of the assembly shop. All of its "components" have been rigorously tested: the drive, feed mechanisms, clamping devices, etc. The program control device was

tested on a special bench. Flipping the switches, the testers watched the readings of the test instruments, and concluded that all parameters are within tolerances, and correspond to those assigned by the designers. Each module is operating precisely; in other words, rock-steady.

Now the machine tool itself is to be tested. The first item involves a no-load green run. The adjuster enters a short test program through the control panel and pushes the Start button. The tool runs for 120 minutes in this mode.

After the green run, the most important stage begins: 8 hours of operation following special test programs. However, these must first be entered. This is done by the operator himself (this is the main difference between the new machine and all of its predecessors). The control panel of the program device, which is somewhat reminiscent of an enlarged "Elektronika" miniature calculator, contains buttons with numbers and symbols designating the operations which the tool executes. The tester inputs a whole series of symbols into the machine in a strictly defined order, indicating the dimensions and order of processing the future part. All of this is stored in the memory of the microcomputer of the tool.

"That line on the screen," points out Yuriy Mikhaylovich, "shows whether the next operation has been coded correctly. While inputting a program, the operator can continually monitor whether the input is correct, and make corrections when an error is detected".

Now the program has been entered, and the test part must be made. The test turner puts the blank in place and closes the protective shield. The Start button is pressed, and a fine lilac-colored stream starts to flow from beneath the tool. Now the machine will do everything from the first operation -- turning a cylinder -- to the last -- cutting threads -- by itself, without human intervention.

While the part is being worked, the chief designer discusses how the new machine tool differs from ordinary equipment with numerical program control.

"There are a lot of differences," says Yuriy Makhaylovich. "The main one is that the tool uses the totally new "Elektronika NTs-31 program control system".

The individual attending the new machine can, when necessary (e.g., when some dimensions of the part are altered due to modernization of the product being produced), make the appropriate changes in the program itself. Furthermore, the program itself may be written by programmers, but can also be written by the workers themselves, following a special task chart produced by the technologists.

Having written a program, it can be tested at any moment, calling any coded operation from machine memory and displaying it in the form of digits and symbols.

As we can see, there are many significant pluses. The amount of time required to write a program has been reduced by several times. The extensive capabilities of controlling the new machine tool make it possible to eliminate many special tools in processing complicated parts, which reduces their total number and simplifies set-up. Furthermore, productivity increases, depending upon the type and complexity of the parts, from 30 to 100%.

... the accustomed low-level droning sound suddenly stopped. The machine has executed the program and automatically shut off.

Lifting the protective shield, the tester removed the finished part and measured the test dimensions: everything is correct!

The tests are completed, and now the machine tool has a long working life ahead of it. The intensive development of automation and electronics has made it possible to free thousands of machinists from heavy, often monotonous and tedious labor, transferring it to the iron shoulders of intelligent machines -- program-controlled machine tools. The proportion of this advanced equipment within the overall pool of machine tools in the enterprises in this country is constantly increasing. However, not only the quantitative jump is important: the steps made in the qualitative improvement of this equipment are also significant. An example of this is the innovation made by designers at the "Krasniy proletariy" machine-tool plant imeni A.I. Yefremov in Moscow. The lathe which they have built with numerical program control is up to date in terms of all indicators. This is the first of a new generation of machine tools with numerical program control from the family of so-called "freely programmable machine tools".

Automatic Foundry Equipment

Moscow IZVESTIYA in Russian 23 Aug 81 p 2

[Article by A. Bol'shakov, Director of the Casting Machinery Plant imeni S.M. Kirov, and deputy of the Supreme Soviet of the USSR, Tiraspol']

[Text] The product of our plant -- machines and automatic lines for precision casting -- is widely known here and abroad. Casting equipment bearing the TIRASPOL' brand is used by KamAZ and ZIL truck builders, by Altay and Yaroslavl' engine builders and by car builders in Nizhniy Tagil. Precision casting brings a gigantic economic effect to the country: during the Tenth Five-Year Plan alone, the introduction of our equipment saved 264,000 tons of metal, freed 12,600 machine tools and over 47,000 foundry workers.

As we know, foundry production is not a very comfortable occupation. Therefore, there is often insufficient personnel in foundries. In improving the machines we produce, we aimed toward equipping them with automatic manipulators capable of replacing human physical labor within the most difficult areas of the technological casting process.

We produce more machines for pressure casting than any other type of precision casting equipment. This method of producing machine and tool parts makes it possible to reduce follow-on processing, often eliminating it altogether. We have been able to create a special manipulator which replaces foundry workers in preparing press-moulds prior to each pour cycle, removing the casting from the mould and all subsequent processing right up to transporting the finished parts to the warehouse.

The functions of the operator consist of observing the operation of the equipment and correcting the technological process when necessary.

In order to evaluate how much the labor has been eased, it is sufficient to say that for just one of these operations -- pouring the metal -- the foundry worker had to move over 5 tons of molten metal per shift using only a heavy ladle. The same amount of labor is also involved in removing the finished castings from the moulds. Manipulator robots used for these operations eliminate manual labor, and make it possible to improve labor productivity significantly, to reduce defects and reduce labor consumption.

During the Tenth Five-Year Plan we produced 673 manipulators, of which 528 are for batch casting, 119 for removing finished castings from moulds, and 26 for preparing casting moulds for pressing.

Implementing the resolutions of the 26th CPSU Congress, our designers are working on creating a multi-machine robot capable of servicing several casting machines simultaneously. Manipulators are also being used successfully on other types of casting machines as well. In particular, they fit well into the operating cycle of automated moulding machines, where they easily handle the difficult operation of removing heavy castings from moulds.

Some time ago, an interdepartmental commission accepted an experimental model of the ALPM automated casting system for manufacturing tractor engine piston blanks by low-pressure casting. Serviced by a single operator, this system produces up to 150 blanks per hour, which is twice the productivity of the previous technology. Furthermore, the coefficient of utilization of metal increased from 0.5 for mould casting to 0.82 for the new method. The system saves more than 100,000 rubles per year. Late last year, we built an experimental model of the ALP-5 system, which makes it possible to cast piston blanks with a more complex inner cavity. The creation of this equipment was the result of creative cooperation between specialists at our plant and the Institute of Casting Problems of the Ukrainian SSR Academy of Sciences.

The plant has been producing a range of automatic lines for casting lined moulds for the past 10 years. A line is a series of robots which execute a group of technological operations involved in obtaining high precision castings of iron and steel. All of the assemblies on a line are interconnected by means of transportation, which results in a closed cycle of technological operations. The elimination of moulding dirt, which makes the shop dirty,

and total automation of the processes involved in obtaining castings improve working conditions significantly and increase production efficiency. Instead of the 28-30 moulders and casters previously involved in making castings using the old method, only 8 operators are now needed to service the line. Producing high precision castings with good quality also makes it possible to minimize the labor involved in subsequent mechanical finishing.

Railroad car chassis and axle-box covers, electric motor frames, distributor shafts and crankshafts for Moskvich automobiles, gear casings and covers, tractor parts -- this is a far from complete list of articles produced on these lines. Each of them provides savings of up to 450,000 rubles per year. These lines are operating successfully today at the Bezhitskiy Steel Casting Plant, the Sibelektromotor Plant in Tomsk, the Tsentrolit Plant in Gomel', the Kirovskiy zavod association in Leningrad, and a number of other large associations and enterprises in this country.

An important stage in developing the structure of casting machines and automatic lines was the transition during the 11th Five-Year Plan from delivering individual types of casting equipment to customers to the integrated delivery of casting sections and foundries. Equipping these sections and foundries with automatic machines, manipulators, electronic test instruments and controllers with computer output capabilities, we are preparing a base for creating automated foundry control systems in foundry production. Thirty percent of the machinery we produce is now equipped with industrial manipulators. During the 11th Five-Year Plan, we intend to increase this proportion to 70 percent.

The first systems to be delivered to the Izhmash production association are being set up and brought to their plant capacity. The engineering and organizational capabilities of lead designer B. Kasapov have been felt in this work; plant workers V. Krivoruchenko, P. Kuleshov, V. Luk'yanov and many others put forth a great deal of effort and ability in achieving innovations.

Considering that foundry production occupies an important place in all branches of industry and is one of the most labor-intensive, the collective at our plant has decided to accelerate the development and production of equipment for large-scale highly mechanized foundries using industrial manipulators in all stages of the technological process, which will make it possible to expand the use of low-waste equipment, and to save measurable amounts of metal, energy and labor resources. This will be our main labor related contribution to the 11th Five-Year Plan.

Automatic Machine Tool Plant

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Jul 81 p 2

[Article by TASS Correspondent V. Yakovlev] "The Automated Machine-Tool Shop"7

[Text] A shop for manufacturing automatic machine tools and manipulators which are not being produced industrially has been built at the Saratov Bearing Plant.

Many production sections have been rehabilitated at the enterprise in recent years, and new high-production lines installed, which make it possible to increase the output of bearings and to improve their quality; however, the demand for this production continues to increase. For example, in order to reduce noise in textile plants, the inventors of spindle mills required bearings with especially high precision. In order to provide these, the Saratov workers had to design and build a special machine for final finishing of the surfaces. As another example, the largest needle bearing shop, where new high-production lines were just installed, product assembly and packaging became a bottleneck. Innovators designed a special automatic machine to take care of these operations.

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METALWORKING EQUIPMENT

PROTECTIVE COATINGS FOR METALS, ALLOYS

Moscow MASHINOSTROITEL' in Russian No 10, Oct 81 (signed to press 5 Oct 81)
pp 11-12

[Article by S.S. Solntsev, doctor of technical sciences: "Protective Coatings in Machine Building"]

[Text] The "Basic directions of the economic and social development of the USSR for 1981-1985 and up to 1990" poses the problem of developing and introducing high efficiency methods for improving the strength qualities, corrosion resistance, and heat- and cold-resistance of metals and alloys, metal constructions and pipes, as well as increasing the production of new construction materials, coatings and articles based on metal powders, powder-alloys and refractory compounds.

Practical implementation of this task is being promoted to a significant degree by work underway at the All-Union Scientific Research Institute for Aviation Materials Science and other institutes and enterprises on creating new high-efficiency protective technical coatings based on silicate and refractory compounds which improve the quality and precision of articles made of metals and alloys and reduce processing labor and metal waste.

The All-Union Interdepartmental Exposition of Protective Technical Metal Coatings which was held for the first time in 1980 at the Exhibition of the Achievements of the National Economy of the USSR, and the second All-Union scientific-technical conference on this theme which was based on the exposition, convincingly confirmed the widespread interest of industry in these coatings. The high technical and economic effectiveness and simplicity of technological processes for obtaining and applying coatings under existing conditions in series and experimental plants, institutes and design bureaus, the possibility of heating metal without oxidation in ordinary furnaces with oxidizing atmosphere, the effectiveness of use as high temperature technological lubricants, low cost and other advantages of protective technical

coatings help enterprises in the machine building branches of the national economy to solve urgent problems of reducing metal waste and loss and improving the service quality of blanks and parts.

There now exist significant possibilities for extensive use of protective technical coatings at enterprises in the machine building branches of industry. The series of articles published in this issue of the journal will undoubtedly promote expanded work on using these coatings in the national economy.

The introduction of progressive technological hot metal processing in machine building makes it possible to reduce waste and losses, labor, energy consumption and article weight. However, these processes require that blanks and parts be heated to high temperatures, as a result of which their surface becomes coated with a layer of scale, loses alloying components, loses carbon and becomes saturated with gases. When the blanks are rolled, the scale is forced into the surface of the sheet, reducing their quality, while during pressing and stamping the scale makes it difficult to obtain precise articles, accelerates the wear of the matrix and die and worsens the working conditions. In removing oxidized layers, metal is consumed by the cutting tool, etching solutions, etc.

Protective technical coatings (PTC) eliminate all of these shortcomings, allowing metal to be heated without oxidation without using any complicated processes prior to hot working of blanks and parts. For example, the brand EVT-100 coating makes it possible to obtain a good surface after high temperature heating, to reduce processing labor, to free metal cutting machine tools, to save argon, electrocorundum and electricity. It also has the practically important property of spontaneously sloughing off the surface of parts when they cool, leaving a bright, unoxidized metal surface.

Brand EVT-24, EVT-26M, EVT-53, EVT-109 and other coatings provide a substantial technical and economic effect. EVT-24 and EVT-53 coatings have made it possible to make precise stampings with reduced allowances, requiring no allowance for machining of type ZhS, EP-109, VT-22 and other high-strength alloys, and to reduce the number of technological operations and the duration of the cycle of obtaining these stampings.

EVT-25 coating has made it possible to implement one of the most advanced hot pressure treatments for metal -- isothermic stamping of titanium alloys -- and as a result to increase the precision of the stampings and the coefficient of metal utilization by a factor of 1.5-2.

EVK-75 coating, which protects the surfaces of parts against oxidizing during heat treatment, stays on the parts and can be used to provide protection against high temperature gas corrosion during operation of engines, high output pumps, turbines and other power equipment.

EVT-100Kh electrodress coating is interesting in that it protects unalloyed and low-alloyed steels at temperatures of 1150-1200°C, which problem until recently could not be solved because of its complexity. Besides its high protective qualities, EVT-100Kh has the properties of a technological lubricant, and improves the physicomachanical characteristics of steels.

Lubricating coatings which stay on the surface of blanks after stamping and pressing and serve as a protective layer during subsequent heat treatment are also of significant interest for industry.

Protective coatings developed at VIAM are widely used in various branches of machine building. The practical operation of the Gor'kiy Aviation Plant imeni S. Ordzhonikidze, the Leningrad Turbine Blade Plant imeni 50th Anniversary of the USSR and many others provides convincing evidence of the importance of PTC for machine building and metalworking enterprises.

The All-Union Scientific Research Institute of the pipe industry (Dnepropetrovsk), the Central Scientific Research Institute for Ferrous Metals imeni Bardin of the Ministry of Ferrous Metallurgy and institutes of other branches have created coatings and glass lubricants which make hot press extrusion of hard alloys possible. In contrast to forging and rolling, this process can be used to make solid and hollow profiles with complex configuration, and reduces the number of conversions, as well as reducing the cost of tools and equipment for working blanks. The output of good pieces with hot pressing can be increased to 70-80%, with the level of reduced costs dropping by 460-3860 rubles per ton of product, depending upon the type of alloy used. Hydraulic presses for producing pipes and profiles, including those made of high strength steel and alloys at the leading plants in this country, use glass lubricants and coatings.

The creation of domestic technical coatings made it possible to avoid purchasing foreign licenses for metal protection processes and obtaining high precision profiles, and to ensure the assimilation of industrial production of parts, blanks, high precision profiles and pipes.

Promising coatings have also been developed at the Khar'kov Polytechnical Institute imeni V.I. Lenin, the Polytechnical Institute imeni S. Ordzhonikidze in Novocherkassk and some other institutions of higher learning. These are providing good surface quality of articles produced by the machine tool, heavy and power machine building industries, and are increasing the durability of casting moulds.

The All-Union Institute of Aviation Materials is the lead organization for protective technical coatings. This institute has done a great deal of scientific research and taken many measures to provide industry with the necessary technological documentation and to render enterprises practical assistance in introducing coatings. Industrial production of coating components has been organized at one of the plants of the Dnepropetrovsk oblast construction materials association, which for many years has provided industry with the initial materials needed to produce coatings.

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